REMARKS

Reconsideration and further examination is respectfully requested.

Objections to Information Disclosure Statement

The information disclosure statement filed 2/22/02 was not considered, for failure to include the Woo-June reference. Applicants have included a new information disclosure statement with the Woo-June reference with this response.

Objections to the Drawings:

The drawings were objected to for failure to include a Prior Art legend in Figure 1. Applicants have amended Figure 1 to include the Prior Art legend as illustrated on the attached sheets. Thus it is submitted that this objection has been overcome by amendment and should be withdrawn.

The drawings were additionally objected to for failing to comply with 37 C.F.R. §1.84(p) (5) because they include reference signs not mentioned in the description , in particular ref. 1430 (see page 15 and Fig. 14). Applicants disagree that this reference is not included in the specification, and direct the Examiner's attention to page 16, line 16 of the specification, which states "... The weight can then be calculated such that $w=1-a^{8/1}$ (Step 1430)" Accordingly, is it respectfully requested that this objection be withdrawn.

The drawings are also objected to under 37 C.F.R. §1.83(a) because they fail to show the shaded region (Fig. 9) as described in the specification (see page 11, line 5). Applicants have amended Figure 9 to show the shaded region in a manner consistent with the description in the

specification, and thus submit that no new matter has been entered by this amendment to the figures.

Applicants have included, attached hereto, a copy of the Figures including the two additions (to Figures 1 and 9, respectfully). Applicant's note that the drawings are still informal, and translation to formal drawings will be performed upon indication of the Examiner of the acceptance of the modifications and the notice of allowability.

Objection to the Specification:

The abstract of the disclosure was objected to for exceeding 150 words in length. In addition, on line 5 of the abstract, the Examiner has indicated that the phrase 'is calculating' should be 'is calculated.'

Applicants have provided a new Abstract of the Disclosure, as shown above. Accordingly, it is submitted that this objection has been overcome and should be withdrawn.

The disclosure was also objected to because of various informalities. Pursuant current PTO practice, Applicant has amended the specification to correct the informalities. The Examiner is thanked for the thorough review of the specification. Accordingly, it is believed that the objections have been overcome, and withdrawal of the objections is requested.

Objections to the claims

The claims were rejected to for various informalities. Applicants have amended the claims to overcome these informalities, and it is therefore submitted that the o bjections have been overcome and should be withdrawn.

Rejections under 35 U.S.C. §112, second paragraph:

Claim 9 was rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. Claim 9 has been amended to recite 'the control function', and thus applicants respectfully request withdrawal of the rejection.

Rejection under 35 U.S.C. §112, first paragraph

Claim 22 was rejected under 35 U.S.C. §112, first paragraph as failing to comply with the enablement requirement. Applicants have amended claim 22 to depend upon claim 20, rather than claim 21, and thus submit that this rejection has been overcome and should be withdrawn.

Rejections under 35 U.S.C. §102

Claims 1-3, 7-9 and 12-16 were rejected under 35 U.S.C. §102(b) as anticipated by Floyd et al.

Floyd describes the basic concepts of Random Early Detection (RED). In particular, Floyd describes, at section 4, page 400, an exemplary algorithm for RED gateways. At section III, page 400, column 1 paragraph 4, Floyd describes "...In this paper, we say that the gateway *marks* a packet and *notifies* the source to reduce the window for that connection. This marking and notification can consist of dropping a packet, setting a bit in a packet header, or some other method understood by the transport protocol. The current feedback mechanism in TCP/IP networks is for the gateway to drop packets..." At page 400, column 2, section IV, Floyd states "The average queue size is compared to two thresholds, a minimum and a maximum threshold.

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When the average queue size is less than the minimum threshold, no packets are marked. When the average queue size is greater than the maximum, every arriving packet is marked... When the average queue size is between the minimum and maximum thresholds, each arriving packet is marked with a probability p_a, where p_a is a function of the average queue size...."

At page 401, paragraph 1, Floyd describes "... The algorithm for calculating the packet-marking probability determines how frequently the gateway marks packets, given the current level of congestion..."

Thus, Floyd takes into account only the actual congestion at the node, and the queue size to determine drop probability. In contrast, the claims of the present invention recites "...A method for controlling a transmission rate of packets in response to a calculated drop probability of the packets at a queue in a receiving node includes the steps of ...systematically calculating a weight for determining a weighted moving average fullness of a the queue in a node ... calculating the weighted moving average ... determining an average queue size based upon the weighted moving average; and *evaluating a control function using the average queue size, the control function defining a drop behavior of packets at the node as for a range of average queue sizes as defined by a congestion control process executing at the node, to determine the drop probability with regard to the average queue size;* and ... *controlling the sending rate of the packets by feeding the calculated drop probability back to the sender...*"

1. Floyd neither describes nor suggests using both an 'average queue size' and 'control function' to calculate the drop probability as recited in the independent claims of the present invention

As described above, Floyd looks at the actual congestion at the node, and the average queue size when calculating the drop probability. In contrast, the present invention examines both the average queue size, and a control function, which is a representation of how the particular congestion control process of the queue operates to select the best packet drop rate and average queue size, in response to changing traffic conditions. The present invention thus can be used in a variety of manners, as described in the specification, to either select a preferred queue size for design using a known congestion protocol, as a feedback mechanism for altering transmission rates to achieve a desired packet drop probability, etc.

2. Floyd neither describes nor suggests the feedback mechanism in many of the independent claims.

Claim 1 recites the limitation of "...controlling the sending rate of the packets by feeding the calculated drop probability back to the sender..." A similar limitation is recited in independent claims 12 and 17. No such structure is shown or suggested by Floyd. Rather, as stated in Floyd, the 'feedback' received from the queue is 'dropping a packet' or 'setting a bit in the header', neither of which suggests or describes the forwarding of the probability to the sender.

In order to support a rejection under 35 U.S.C. §102, every limitation of the claims must be shown or suggested in the prior art. Because Floyd neither describes or suggests using the 'average queue size' and the 'control function', as now more clearly defined in the claims, for the calculation of drop probability, independent claims 1, 7 and 12 are patentably distinct over Floyd.

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In addition, also for the reason that Floyd neither describes nor suggests the feedback mechanism described above, claims 1, 7 and 12 are patentable over Floyd, and the rejection should be withdrawn. Claims 2-6, 8-9 and 13- 14 depend on claims 1, 7 and 12, respectively, and are patentable for at least the reasons put forth above with regard to those claims.

Rejections under 35 U.S.C. §103

Claims 4-6, 10 and 17-26 were rejected under 35 U.S.C. §103(a) as being unpatentable over Floyd. As mentioned above, claims 4-6 serve to limit claim 1 and are allowable with claim 1.

Applicant's claim 10, as amended, now recites "...A method for increasing utilization of a link capable of receiving a number of flows into a buffer, the link residing in a TCP network, the link having a congestion control module which drops packets to avoid buffer overflow, the method comprising ... determining a quality representative of a capacity for the link; ... calculating a quantity representative of the throughput for the link; ... determining the utilization based on the capacity of the link, the throughput of the link, the numbers of flows and *a packet drop probability calculated based on an average queue size and control function associated with a congestion control process of the link;* and .. .*automatically* adjusting the packet drop probability to maintain a desired_utilization of the link

As stated above with regard to claim 1, Floyd neither describes nor suggests "...*a packet drop probability calculated based on an average queue size and control function associated with a congestion control process of the link...*" Accordingly, for at least this reason, claim 10 is patentably distinct over Floyd, and the rejection should be withdrawn. Claim 26 includes a similar limitation, and thus is also patentable over the art.

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Claim 17 now recites "...*computer code for evaluating a control function based on a congestion control process executing at the node, the control function defining a range of drop probabilities for a range of average queue sizes responsive to the congestion control process*; using the average queue size to determine the drop probability; *and computer code providing a feedback mechanism for forwarding the determined drop probability to the sender to control the sender's transmission of packets such that a desired drop probability is attained....*"

As discussed above, Floyd neither describes nor suggests such limitations, and thus claim 17 is patentable over the cited art. Dependent claims 18-22 serve to limit claim 17 and are thus allowable with claim 17. Claim 26 includes limitations similar to those put forth with regard to claim 10, and is allowable for similar reasons.

Claim 23 recites the elements of "...computer code for selecting a packet drop rate equal in response *to the packet drop probability defined at a point of intersection of the control function and the queue law function....*" No such structure is shown or suggested by Floyd. Thus, Independent claim 23, and dependent claims 24-25 are allowable over the art.

Claims 11 and 27 were rejected under 35 U.S.C. §103(a) as being unpatentable over Floyd in view of Silberschatz (U.S. Patent 6,556,578).

Silberschatz describes a method for managing a buffer pool containing a plurality of queues based on consideration of (a) when to drop the packet and (b) from which queue the packet should be dropped. Silberschatz fails to overcome the inadequacies of Floyd with regard to the independent claims, including "...computer code for ascertaining a network function which <u>defines</u> an average queue size of the queue based upon a range of server drop rates for the

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congestion control process..." Accordingly, for at least this reason, claims 11 and 27, the

combination of Silberschatz and Floyd neither describes nor suggests the claimed invention, and

the rejection should be withdrawn.

Applicants have made a diligent effort to place the claims in condition for allowance.

However, should there remain unresolved issues that require adverse action, it is respectfully

requested that the Examiner telephone Lindsay G. McGuinness, Applicants' Attorney at 978-264-

6664 so that such issues may be resolved as expeditiously as possible.

For these reasons, and in view of the above amendments, this application is now

considered to be in condition for allowance and such action is earnestly solicited.

Respectfully Submitted,

1/22/2004
Date
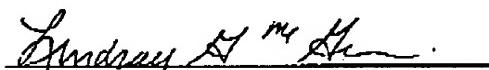
Lindsay G. McGuinness, Reg. No. 38,549
Attorney/Agent for Applicant(s)
Steubing McGuinness & Manaras LLP
125 Nagog Park Drive
Acton, MA 01720
(978) 264-6664

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